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10/673,223	09/30/2003	Lei Ding	29250-001081/US	1580

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EXAMINER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
Office Action Summary	10/673,223	DING ET AL.
	Examiner	**Art Unit**	
	Siu M. Lee	2611	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 September 2007*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,7-10,13-19 and 23-25* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,7-10,13-19 and 23-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

2.   Claims 1, 2, 4, 13-19, and 23-25 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Wright et al. (US 5,990,734) in view of Gu (US 2003/0072393 A1).

(1) Regarding claim 1:

an upconverter (upconverter (RF upconversion) 23 or 24 in figure 2, column 7,

lines 46-47) for converting one frequency signal to another frequency signal (column 10,

lines 10-18);

a compensator constructor (adaptive control processing and compensation

estimator (ACPCE) 28 in figure 2), based on a channel model of at least the direct

upconverter (fig. 16 depicts a mathematical model structure that may be used to model

the analog chain including the upconverter, column 26, lines 35-42) that includes an in-

phase channel, a quadrature phase channel and cross coupling channels between the

in-phase and quadrature phase channels (quadrature modulator compensation 161 and

162 in figure 19 contain an I channel I(t) correction, a Q channel Q(t) correction and a

IQ crosstalk correction), estimating the in-phase channel, the quadrature phase

channel, and the cross coupling channels between the in-phase and quadrature phase

components (the I and Q channel is being scale by the correction coefficient to correct

for the gain imbalance, DC+LO offset, the IQ crosstalk correction (cross coupling) take

one channel (in this case the Q channel but the inverse arrangement is a valid

alternative) and scale it before adding it to the other channel) and constructing filters in

the filter unit based on the estimates (the third stage of the system identification is used

to identify the imperfections of the LINC amplifier by adjusting the parameters of the

parallel numerical model such that the observed amplifier output and predicted amplifier

output are substantially identical. Once this has been achieved the parameters of the

numerical model may be used to compute the initial compensation parameters of the

digital compensation signal processing block 21, column 24, line 60-column 25, line 1).

Wright et al. fails to disclose a compensator including a plurality of filters units for

compensating at least one of gain distortion and phase distortion introduced into the

one frequency signal by at least the upconverter, the plurality of filter units including a

first sets of filter units configured to filter the in-phase components and quadrature

phase components, output of the first set of filter units producing at least one of a gain

compensated in-phase signal and a phase compensated in-phase signal, and a second

set of filter units configured to filter the in-phase components and quadrature phase

components, output of second set of filter units producing at least one of a gain

compensated quadrature-phase signal and a phase compensated quadrature-phase

signal.

However, Gu discloses a compensator (feed forward compensator as disclose in

figure 9) including a plurality of filters units (A, B, C, D may be transfer functions of any

realizable linear system with gain and delay profile over a frequency band, paragraph 0077, lines 14-16) for compensating at least one of gain distortion and phase distortion introduced into the one frequency signal by at least the upconverter (I-Q imbalance and I-Q cross-talk), the plurality of filter units including a first sets of filter units (A and C in figure 9) configured to filter the in-phase components (A filtered the I_{in}) and quadrature phase components (C filtered the Q_{in}), output of the first set of filter units producing at least one of a gain compensated in-phase signal and a phase compensated in-phase signal (the two filtered signal are added together to generate the I_{out} signal and compensate for the I-Q imbalance and I-Q cross-talk), and a second set of filter units (filter units B and D) configured to filter the in-phase components (B filtered the I_{in}) and quadrature phase components (C filtered the Q_{in}), output of second set of filter units producing at least one of a gain compensated quadrature-phase signal and a phase compensated quadrature-phase signal (the two filtered signal are added together to generate the Q_{out} signal and compensate for the I-Q imbalance and I-Q cross-talk).

It is desirable to have a compensator including a plurality of filters units for compensating at least one of gain distortion and phase distortion introduced into the one frequency signal by at least the upconverter, the plurality of filter units including a first sets of filter units configured to filter the in-phase components and quadrature phase components, output of the first set of filter units producing at least one of a gain compensated in-phase signal and a phase compensated in-phase signal, and a second set of filter units configured to filter the in-phase components and quadrature phase components, output of second set of filter units producing at least one of a gain

compensated quadrature-phase signal and a phase compensated quadrature-phase signal because it immune from I-Q imbalance cause by circuitry mismatch and component disparity (paragraph 0098, lines 1-4). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Gu with the system of Wright et al. to improve the performance of the system.

(2) Regarding claim 2:

Wright et al. discloses a transmitter wherein the upconverter (upconverter 23 and 24 in figure 2, column 7, lines 46-47) is a direct upconverter for directly upconverting a baseband signal to an RF signal (direct conversion from complex baseband signal to radio frequency signal) (column 10, lines 10-18); and Gu further discloses the compensator (feed forward compensator as disclose in figure 9) compensates for at least one of gain imbalance and phase imbalance introduced into the baseband signal by at least the direct up converter (it immune from I-Q imbalance and I-Q crosstalk cause by circuitry mismatch and component disparity (paragraph 0077, lines 16-18, paragraph 0098, lines 1-4)).

(3) Regarding claim 4:

Wright et al. discloses a transmitter wherein the compensator (digital compensation signal processor (DCSP) 21 in figure 2) compensates for dc offset introduced into the baseband signal by at least the direct upconverter (column 18, lines 7-17, column 26, lines 37-42).

(4) Regarding claim 13:

Wright et al. further discloses a transmitter wherein the compensator compensates for dc offset introduced into the lower frequency signal by at least the upconverter (as shown in figure 10B, the I channel DC offset correct and the Q DC offset correct compensate for the DC offset introduced by the analog chain, column 18, lines 58-61).

(5) Regarding claim 14:

Wright et al. discloses a transmitter comprising:

a direct upconverter for converting a baseband signal directly to an RF signal, the baseband signal including in-phase and quadrature-phase components (upconverter (RF upconversion) 23 or 24 in figure 2, column 7, lines 46-47, for converting one frequency signal to another frequency signal, the baseband signal comprises $Ph_{Adc}(t)$ and $Ph_{Bdc}(t)$ components, column 10, lines 10-18).

Wright et al. fails to disclose a compensator including a first filter for filtering the in-phase component to compensate for at least one of gain imbalance and phase imbalance in the in-phase components, a second filter for filtering the quadrature phase component to compensate for at least one of gain imbalance and phase imbalance in the in-phase component associated with cross-coupling of the quadrature phase component with the in-phase components, a third filter for filtering the quadrature phase component to compensate for at least one of gain imbalance and phase imbalance in the quadrature phase component, and a fourth filter for filtering the in-phase component to compensate for at least one of gain imbalance and phase imbalance in the

quadrature component associated with cross-coupling of the in-phase component with the quadrature component.

However, Gu discloses a compensator (compensator discloses in figure 9) including a first filter (filter A) for filtering the in-phase component (I_{in}) to compensate for at least one of gain imbalance and phase imbalance in the in-phase components (the filter A filtered the I_{in} and compensate for the I-Q imbalance and I-Q crosstalk, paragraph 0077, lines 14-18), a second filter (filter C) for filtering the quadrature phase component (Q_{in}) to compensate for at least one of gain imbalance and phase imbalance in the in-phase component associated with cross-coupling of the quadrature phase component with the in-phase components (filter C filter the Q_{in} and compensate for the I-Q imbalance and I-Q crosstalk and cross-couple with the filtered I_{in} signal and generate the I_{out} in the adder as discloses in figure 9, paragraph 0077, lines 14-18), a third filter (filter D) for filtering the quadrature phase component (Q_{in}) to compensate for at least one of gain imbalance and phase imbalance in the quadrature phase component (the filter D filtered the Q_{in} and compensate for the I-Q imbalance and I-Q crosstalk, paragraph 0077, lines 14-18), and a fourth filter (filter B) for filtering the in-phase component (I_{in}) to compensate for at least one of gain imbalance and phase imbalance in the quadrature component associated with cross-coupling of the in-phase component with the quadrature component (filter B filter the I_{in} and compensate for the I-Q imbalance and I-Q crosstalk and cross-couple with the filtered Q_{in} signal and generate the Q_{out} signal in the adder as discloses in figure 9, paragraph 0077, lines 14-18).

It is desirable to have a compensator including a first filter for filtering the in-phase component to compensate for at least one of gain imbalance and phase imbalance in the in-phase components, a second filter for filtering the quadrature phase component to compensate for at least one of gain imbalance and phase imbalance in the in-phase component associated with cross-coupling of the quadrature phase component with the in-phase components, a third filter for filtering the quadrature phase component to compensate for at least one of gain imbalance and phase imbalance in the quadrature phase component, and a fourth filter for filtering the in-phase component to compensate for at least one of gain imbalance and phase imbalance in the quadrature component associated with cross-coupling of the in-phase component with the quadrature component because it immune from I-Q imbalance cause by circuitry mismatch and component disparity (paragraph 0098, lines 1-4). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Gu with the system of Wright et al. to improve the performance of the system.

(6) Regarding claim 15:

Wright et al. discloses wherein the direct upconverter (RF upconversion 23 and 24 in figure 2) receives output form the compensator (digital compensation signal processor 21 in figure 2).

Wright et al. fails to disclose the compensator comprises a first adder adding the output of the first and second filter and a second adder adding the output of the third and fourth filters.

However, Gu further discloses a compensator that comprises a first adder adding

output of the first and second filters (the adder that add the output of the filter A and

filter C as discloses in figure 9); a second adder adding output of the third and fourth

filters (the adder that add the output of the filter B and filter D as discloses in figure 9)

and wherein the direct upconverter receives output from the first and second adders.

It is desirable to have a compensator that comprises a first adder adding the

output of the first and second filter and a second adder adding the output of the third

and fourth filters because it immune from I-Q imbalance cause by circuitry mismatch

and component disparity (paragraph 0098, lines 1-4). Therefore it would have been

obvious to one of ordinary skill in the art at the time of invention to combine the teaching

of Gu with the system of Wright et al. to improve the performance of the system.

(7) Regarding claim 16:

Wright et al. further discloses that the transmitter further comprises:

a third adder (the adder for the I channel dc+lo offset correct in the signal path

106 in figure 10B) adding a first dc offset to the in-phase component to compensate for

dc offset introduced into the baseband signal by at least the direct upconverter (the last

adjustment is a shift up or down to counteract DC offset, column 19, lines 4-5); and

a fourth adder (the adder for the Q channel dc+lo offset correct in the signal path

107 in figure 10B) adding a second dc offset to the quadrature phase component to

compensate for dc offset introduced into the baseband signal by at least the direct

upconverter (the last adjustment is a shift up or down to counteract DC offset, column

19, lines 4-5); and wherein the direct upconverter receives output from the third and

fourth adders the upconverter (RF upconversion 23 and 24 in figure 2 receives output

form the compensator (digital compensation signal processor 21 in figure 2)).

(8) Regarding claim 17:

Wright et al discloses a method of generating RF signal comprising:

up converting one frequency signal to another frequency signal (upconvert

baseband signal to radio frequency signal by the RF conversion 23 and 24 in figure 2)

(column 10, lines 10-18); and

deriving, based on a channel model of at least the upconverting step (fig 16

depicts a mathematical model structure that may be used to model the analog chain

including the upconverter, column 26, lines 35-42) that includes an in-phase channel, a

quadrature phase channel and cross coupling channels between the in-phase and

quadrature phase channels (quadrature modulator compensation 161 and 162 in figure

19 contain an I channel I(t) correction, a Q channel Q(t) correction and a IQ crosstalk

correction), estimates of the in-phase channel, the quadrature phase channel, and the

cross coupling channels between the in-phase and quadrature phase components (the I

and Q channel is being scale by the correction coefficient to correct for the gain

imbalance, DC+LO offset, the IQ crosstalk correction (cross coupling) take one channel

(in this case the Q channel but the inverse arrangement is a valid alternative) and scale

it before adding it to the other channel);

and constructing filters in the filter unit based on the estimates (the third stage of

the system identification is used to identify the imperfections of the LINC amplifier by

adjusting the parameters of the parallel numerical model such that the observed

amplifier output and predicted amplifier output are substantially identical. Once this has been achieved the parameters of the numerical model may be used to compute the initial compensation parameters of the digital compensation signal processing block 21, column 24, line 60-column 25, line1).

Wright et al. fails to disclose compensating using a plurality of filter units for at least one of gain and phase distortion introduced into the one frequency signal by at least the upconversion, the plurality of filter units including a first set of filter units configured to filter the in-phase components and quadrature phase components, output of the first set of filter units producing at least one of a gain compensated in-phase signal and a phase compensated in-phase signal, and a second set of filter units configured to filter the in-phase components quadrature phase components, output of second set of filter units producing at least one of a gain compensated quadrature-phase signal and a phase compensated quadrature-phase signal.

However, Gu discloses a compensator (feed forward compensator as disclose in figure 9) including a plurality of filters units (A, B, C, D may be transfer functions of any realizable linear system with gain and delay profile over a frequency band, paragraph 0077, lines 14-16) for compensating at least one of gain distortion and phase distortion introduced into the one frequency signal by at least the upconverter (I-Q imbalance and I-Q cross-talk), the plurality of filter units including a first sets of filter units (A and C in figure 9) configured to filter the in-phase components (A filtered the I_{in}) and quadrature phase components (C filtered the Q_{in}), output of the first set of filter units producing at least one of a gain compensated in-phase signal and a phase compensated in-phase

signal (the two filtered signal are added together to generate the I_{out} signal and compensate for the I-Q imbalance and I-Q cross-talk), and a second set of filter units (filter units B and D) configured to filter the in-phase components (B filtered the I_{in}) and quadrature phase components (C filtered the Q_{in}), output of second set of filter units producing at least one of a gain compensated quadrature-phase signal and a phase compensated quadrature-phase signal (the two filtered signal are added together to generate the Q_{out} signal and compensate for the I-Q imbalance and I-Q cross-talk).

It is desirable to have a compensator including a plurality of filters units for compensating at least one of gain distortion and phase distortion introduced into the one frequency signal by at least the upconverter, the plurality of filter units including a first sets of filter units configured to filter the in-phase components and quadrature phase components, output of the first set of filter units producing at least one of a gain compensated in-phase signal and a phase compensated in-phase signal, and a second set of filter units configured to filter the in-phase components and quadrature phase components, output of second set of filter units producing at least one of a gain compensated quadrature-phase signal and a phase compensated quadrature-phase signal because it immune from I-Q imbalance cause by circuitry mismatch and component disparity (paragraph 0098, lines 1-4). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Gu with the system of Wright et al. to improve the performance of the system.

(9) Regarding claim 18:

Wright et al. discloses a method further comprising compensating for dc offset

introduced into a lower frequency signal by at least the upconversion (the digital

compensation signal processor 21 in figure 2 compensates for the DC offset introduced

in the analog chain including the RF upconversion) (column 9, lines 29-36).

(10) Regarding claim 19:

Wright et al. disclose a method wherein the up converting step directly up

converts a baseband signal to the RF signal (column 10, lines 10-18).

(11) Regarding claim 23:

Gu further discloses wherein:

the first set of filter (filter A and C in figure 9) include a first filter unit to filter the

in-phase components (A filtered the I_{in}) and a second filter unit configured to filter the

quadrature phase components (C filtered the Q_{in}); and the second set of filter units (filter

units B and D) include a third filter unit configured to filter the in-phase components (B

filtered the I_{in}) at what and a fourth filter unit configured to filter the quadrature phase

components (D filtered the Q_{in} as shown in figure 9).

(12) Regarding claim 24:

Gu further discloses:

a first adder configured to add the output of the first and second filter units to

produce the at least one of the gain compensated in-phase signal and the phase

compensated in-phase signal (the filtered output of the filter unit A and the filtered

output of the filter unit C are added together to generate the I_{out} signal and compensate

for the I-Q imbalance and I-Q cross-talk as shown in figure 9, paragraph 0077, lines 14-18); and

a second adder configured to add the output of the third and fourth filter units to produce the at least one of the gain compensated quadrature-phase signal and the phase compensated quadrature-phase signal (the filtered output of the filter unit B and the filtered output of the filter unit D are added together to generate the Q_{out} signal and compensate for the I-Q imbalance and I-Q cross-talk as shown in figure 9, paragraph 0077, lines 14-18).

(13) Regarding claim 25:

Wright et al. discloses:

a third adder configured to add an in-phase DC components to the in-phase signal (as shown in figure 10B, the adder on the signal 106 added the I channel DC=LO offset correct to the in-phase signal); and

a fourth added configured to add a quadrature-phase DC component to the quadrature-phase signal, wherein the in-phase DC component and the quadrature-phase DC component compensates DC offset (as shown in figure 10B, the adder on the signal 107 added the Q channel DC+LO offset correct to the quadrature-phase signal).

3.   Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wright et al. (US 5,990,734) in view of Gu (US 2003/0072393 A1) as applied to claim 2 above, and further in view of Zhang (US 6,687,311 B1).

(1) Regarding claim 8:

Wright et al. and Gu disclose an amplifier to be used in a transmitter wherein the compensator constructor estimates each of the of the in-phase channel (the I channel I(t) in figure 19), the quadrature phase channel (the Q channel Q(t) in figure 19), and the cross coupling channels between the in-phase and quadrature phase channels (IQ crosstalk correction in figure 19) based on output from a analog chain including the upconverter and the amplifier.

Wright et al. and Gu fail to disclose the compensator constructor estimations are based on output from the compensator and a baseband signal derived from output of the direct upconverter.

However, Zhang discloses a system comprising a compensator constructor estimations (monitor 240 in figure 2 monitors the amplitude and phase of the RF signal and provides corresponding amplitude and phase adjustment information to the equalizer 207 via a feedback path 245, column 3, lines 55-60) based on output from the compensator (digital filter 205 in figure 2) and a baseband signal derived from output of the direct upconverter (RF driver 230 in figure 2).

It is desirable to derive an inverse of the channel model for the direct upconverter because the complexity and cost of the system is substantially reduced, thereby resulting in significant savings (column 5, lines 55-57). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Zhang in the system of Wright et al. and Gu to reduce the manufacturing cost of the system.

(2) Regarding claim 9:

Wright et al and Gu disclose an amplifier to be used in a transmitter comprising a feedback path including a down converter (RF down converter 26 in figure 2) down converting output of the analog chain and wherein the compensator constructor (adaptive control processing and compensation estimator (ACPCE) 28 in figure 2) receives a signal on the feedback path.

Wright et al. and Gu fail to disclose a feedback path from the output of the direct upconverter.

However, Zhang teaches a system that comprises a feedback path (feedback path 245 in figure 2, column 3, lines 59-60) from the output of the direct upconverter (the direct QAM modulator 200 in figure 2 does not use an IF stage, therefore, it is using a direct upconverter RF driver 230 in figure 2, column 3, lines 61-63).

It is desirable to employ the teaching of Zhang with the system of Wright et al. because the complexity and cost of the system is substantially reduced, thereby resulting in significant savings (column 5, lines 55-57). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Zhang in the system of Wright et al. and Gu to reduce the manufacturing cost of the system.

(3) Regarding claim 10:

Wright et al. further discloses a amplifier to be used in a transmitter further comprising a power amplifier (amplifier 15 and 16 in figure 2, column 8, lines 43-45) amplifying the RF signal for transmission (amplifiers 15 and 16 are connected to the output of the RF upconverter 23 and 24 in figure 2); a feedback path including a down

converter (RF down conversion 26 in figure 2) down converting output of the power

amplifier; and wherein the compensator constructor (adaptive control processing and

compensation estimator (ACPCE) 28 in figure 2) receives a signal on the feedback

path.

4.   Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wright et

al. (US 5,990,734) in view of Gu (US 2003/0072393 A1) as applied to claim 2 above,

and further in view of Zhang (US 6,687,311 B1) and Birru (US 2002/0037058 A1).

Wright et al. and Gu further disclose a transmitter wherein the compensator

constructor (adaptive control processing and compensation estimator (ACPCE) 28 in

figure 2) derives the filters as an inverse of the channel model for the analog chain

including the upconverter, which represents a mean squared error (Least mean square

algorithm that minimize the root mean square value, column 28, lines 12-20), in the

frequency domain (frequency dependent amplitude, delay and phase ripple can be

modeled, column 27, lines 1-2), between a desired response of a system including at

least the direct upconverter ($S_{predicted}(t)$ represent the calculated equivalent of the output,

column 26, lines 55-56) and an actual response of the system including at least the

filters and the direct upconverter ($S_{obs}(t)$ represent the observed power amplifier output

from the analog chain including the upconverter, column 27, lines 17-21) (equation 8 in

column 27, line 51 represent the difference between the observed recombined signal

sampled from the analog down conversion and the executed output that was predicted

by the LINC model used for system identification, column 27, lines 62-65).

Wright et al. and Gu fail to disclose; (a) derives the inverse of the channel model derived from a cost function and (b) derives the filters as an inverse of the channel model for the direct upconverter.

With respect to (a), Birru discloses the inverse of the channel model derived from a cost function (claim 11 in page 6, Birru discloses a frequency domain equalizer that calculate the frequency domain inverse channel estimate utilizing a least square cost function).

It is desirable to calculate the inverse of the channel model derived from a cost function in frequency domain because it is a more cost-effective solution (paragraph 0059, lines 5-6). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Birru with the system of Wright et al. and Gu to reduce the cost of the system.

With respect to (b), Zhang discloses a system that derives an inverse of the channel model for the direct upconverter (column 3, lines 55-60).

It is desirable to derive an inverse of the channel model for the direct upconverter because the complexity and cost of the system is substantially reduced, thereby resulting in significant savings (column 5, lines 55-57). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Zhang in the system of Wright et al. and Gu to reduce the manufacturing cost of the system.

Conclusion

5.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Khlat (US 7,158,578 B2) discloses a quadrature modulator with pulse-shaping. Juan (US 5,642,382) discloses a FIR filters with multiplexed inputs suitable for use in reconfigurable adaptive equalizer. Alelyunas et al. (US 5,705,949) discloses a compensation method for I/Q channel imbalance errors. Li et al. (US 7,061,994 B2) discloses a methods and apparatus for I/Q imbalance compensation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Siu M. Lee whose telephone number is (571) 270-1083. The examiner can normally be reached on Mon-Fri, 7:30-4:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

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USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Siu M Lee
Examiner
Art Unit 2611
11/14/2007

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER